Appendix 3: Cost Estimates for No Name Slough Project Alternatives

Part 1: Upland Project Alternatives

No Name Watershed Project Cost Estimate Worksheet

Project Name: Peth Wetland Enhancement

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
404 and CAO permitting	hours	$90	80	$7,200	Extensive permitting - already wetland
Subtotal				$12,600	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	3.0	$7,500	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$13,500	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - excav. and berms	CY	$12	1600	$19,200	
Flow control weirs	each	$5,000	1	$5,000	
Fencing	LF	$3	2100	$6,300	
Plantings - buffer	acre	$3,750	0.72	$2,700	
Plantings - emergents	acre	$1,250	2.0	$2,500	
TESC seeding and mulching	acre	$500	1.4	$700	
Subtotal				$36,400	
Tax				$2,876	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.72	10	$2,780
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$6,641

5. Summary

Total Present Worth Cost	$72,016
Add 15% contingency	$82,819

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Richards Wetland Enhancement No. 1

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
404 and CAO permitting	hours	$90	80	$7,200	Extensive permitting - already wetland
Subtotal				$12,600	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	4.0	$10,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$16,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - excav. and berms	CY	$12	1600	$19,200	
Flow control weirs	each	$5,000	1	$5,000	
Fencing	LF	$3	1000	$3,000	
Plantings - buffer	acre	$3,750	0.69	$2,588	
Plantings - emergents	acre	$1,250	2	$2,500	
TESC seeding and mulching	acre	$500	1	$500	
Subtotal				$32,788	
Tax				$2,590	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.7	10	$2,703
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$6,563

5. Summary

Total Present Worth Cost	$70,541
Add 15% contingency	$81,122

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Richards/McDougle Ditch Buffer

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$50	40	$2,000	
Subtotal				$2,000	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	2.0	$5,000	might not need a cons. easement
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$11,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Fencing	LF	$3	2200	$6,600	
Plantings - buffer	acre	$3,750	1.52	$5,700	
Subtotal				$12,300	
Tax				$972	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	1.52	10	$5,868
Buffer monitoring	l.s.	$300	1	10	$2,317
Subtotal					$8,185

5. Summary

Total Present Worth Cost	$34,457
Add 15% contingency	$39,625

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers

2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Richards Wetland Enhancement No. 2

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
404 and CAO permitting	hours	$90	80	$7,200	Extensive permitting - already wetland
Subtotal				$12,600	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	2.0	$5,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$11,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - excav. and berms	CY	$12	800	$9,600	
Flow control weirs	each	$5,000	1	$5,000	
Fencing	LF	$3	1050	$3,150	
Plantings - buffer	acre	$3,750	0.72	$2,700	
Plantings - emergents	acre	$1,250	1.0	$1,250	
TESC seeding and mulching	acre	$500	0.7	$350	Assumes 30 sf per feet of berm
Subtotal				$22,050	
Tax				$1,742	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.72	10	$2,780
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$6,641

5. Summary

Total Present Worth Cost	$54,033
Add 15% contingency	$62,138

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Josh Wilson Road Bioswale

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	50	$4,500	
County permitting	hours	$90	40	$3,600	Unclear what DPW will require
Subtotal				$8,100	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Modify existing road easement	lump sum	$5,000	1	$5,000	
Subtotal				$5,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - grading	CY	$15	300	$4,500	10' width, avg. depth = 1'
Rock grade controls / weirs	each	$500	8	$4,000	100' spacing
Imported gravel and compost	CY	$15	120	$1,800	3" to 6" depth; 15 cy per 100 LF
Traffic control during construction	days	$1,000	5	$5,000	
Plantings emergents and shrubs	LF	$20	800	$16,000	10 plants per LF
Subtotal				$31,300	
Tax				$2,473	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining plantings	acres	$600	0.18	10	$834	
Monitoring	l.s.	$800	1	10	$6,177	includes WQ mon.
Subtotal					$7,011	

5. Summary

Total Present Worth Cost	$53,884
Add 15% contingency	$61,967

Notes

1. For plantings, assumes emergents and shrubs on 1' spacing or 10 pieces per linear foot @ $2.00 each
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Upper No Name Creek Riparian Buffer

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$50	50	$2,500	
Subtotal				$2,500	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	3.0	$7,500	might not need a cons. easement
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$13,500	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Fencing	LF	$3	4000	$12,000	
Plantings - buffer	acre	$3,750	2.75	$10,313	750 trees/acre @ 5$ ea.
Subtotal				$22,313	
Tax				$1,763	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	2.75	10	$10,617
Buffer monitoring	l.s.	$300	1	10	$2,317
Subtotal					$12,934

5. Summary

Total Present Worth Cost	$53,009
Add 15% contingency	$60,960

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers

2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Field Ditch Flow Control

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$75	40	$3,000	
Subtotal				$3,000	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	assumes no easement needed
Transaction costs	lump sum	$6,000	0	$0	
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Flow control weir	each	$5,000	1	$5,000	
Fencing	LF	$3	0	$0	assumes no fencing
Plantings - buffer	acre	$3,750	0	$0	assumes no plantings
Subtotal				$5,000	
Tax				$395	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Weir maintenance	l.s.	$200	1	10	$1,544
Monitoring	l.s.	$300	0	10	$0
Subtotal					$1,544

5. Summary

Total Present Worth Cost	$9,939
Add 15% contingency	$11,430

Notes

1. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Expansion of Tolum Pond

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
HPA, 404 and CAO permitting	hours	$90	80	$7,200	Wetland and creek permitting
Subtotal				$12,600	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	2.0	$5,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$11,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - excav. and berms	CY	$12	1600	$19,200	
Flow control structure	each	$10,000	1	$10,000	See note
Fencing	LF	$3	750	$2,250	
Plantings - buffer	acre	$3,750	0.52	$1,950	
Plantings - emergents	acre	$1,250	1.0	$1,250	
TESC seeding and mulching	acre	$500	0.5	$250	Assumes 30 sf per feet of berm
Stream protection BMPs	lump sum	$1,000	1.0	$1,000	
Subtotal				$35,900	
Tax				$2,836	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.52	10	$2,008
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$5,868

5. Summary

Total Present Worth Cost	$68,205
Add 15% contingency	$78,435

Notes

1. Flow control structure to be a variable orifice outlet that lets high water from creek flow in and then meters out base flow water slowly.
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)

3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Marihugh Road Septic Tank Replacement

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Project management	hours	$75	20	$1,500	Includes arranging loan/grant
Design and permitting	hours	$75	20	$1,500	by licensed designer
Subtotal				$3,000	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	(no land acquisition needed)
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Remove existing system	l.s.	$1,000	1	$1,000	
Supply and install new system	l.s.	$10,000	1	$10,000	See note
Subtotal				$11,000	
Tax				$869	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
WQ monitoring in creek	l.s.	$300	1	2	$600
Subtotal					$600

5. Summary

Total Present Worth Cost	$15,469
Add 15% contingency	$17,789

Notes

1. Assumes removal of existing system and installation of a new pressurized mound system

No Name Watershed Project Cost Estimate Worksheet

Project Name: Greiner Floodplain Reconnection

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
HPA and CAO permitting	hours	$90	60	$5,400	
Subtotal				$10,800	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	1.0	$2,500	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$8,500	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Temporary site access	lump sum	$3,000	1	$3,000	temp. bridge across creek
Earthwork - excav. and berms	CY	$15	1600	$24,000	see note
Rip rap removal	CY	$15	10	$150	
Porous rock weir	each	$2,000	1	$2,000	
LWD for grade control & mitigation	each	$500	6	$3,000	Provide and install
Plantings - emergents	acre	$1,250	1.0	$1,250	
TESC / Stream protection BMPs	lump sum	$2,000	1.0	$2,000	
Subtotal				$35,400	
Tax				$2,797	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plantings	acres	$300	1	10	$2,317
Monitoring	l.s.	$300	1	10	$2,317
Subtotal					$4,633

5. Summary

Total Present Worth Cost	$62,130
Add 15% contingency	$71,449

Notes

1. Unit cost of excavation assumed to be $15 due to difficult access conditions, need to remove logging debris, and need to remove soil from site
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Schaffer Creek Channel Stabilization

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
HPA and CAO permitting	hours	$90	60	$5,400	
Subtotal				$10,800	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Clearing for construction access	lump sum	$300	1	$300	see note
LWD for grade control and habitat	each	$500	10	$5,000	provide and install
bank regrading	CY	$50	10	$500	
Plugging existing field ditch outlet	lump sum	$200	1	$200	
Seeding and mulching	acre	$500	0.2	$100	
Replanting construction access	acre	$3,750	0.2	$750	
TESC / Stream protection BMPs	lump sum	$2,000	1.0	$2,000	
Subtotal				$8,850	
Tax				$699	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plantings	acres	$300	0.2	10	$463
Effectiveness monitoring	lump sum	$300	1	10	$2,317
Maintaining LWD	lump sum	$300	1	10	$2,317
Subtotal					$5,096

5. Summary

Total Present Worth Cost	$25,445
Add 15% contingency	$29,262

Notes

1. Assumes construction access through Schaffer pasture and limited clearing along the left bank of the creek.

2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each

3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Farm to Market Road Bioswale No.1

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	50	$4,500	
County permitting	hours	$90	40	$3,600	Unclear what DPW will require
Subtotal				$8,100	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Modify existing road easement	lump sum	$5,000	1	$5,000	
Subtotal				$5,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - grading	CY	$15	100	$1,500	10' width, avg. depth = 1'
Rock grade controls / weirs	each	$500	3	$1,500	100' spacing
Imported gravel and compost	CY	$15	45	$675	3" to 6" depth; 15 cy per 100 LF
Traffic control during construction	days	$1,000	2	$2,000	
Plantings emergents and shrubs	LF	$20	300	$6,000	10 plants per LF
Subtotal				$11,675	
Tax				$922	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining plantings	acres	$600	0.07	10	$324	
Monitoring	l.s.	$800	1	10	$6,177	includes WQ mon.
Subtotal					$6,502	

5. Summary

Total Present Worth Cost	$32,199
Add 15% contingency	$37,029

Notes

1. For plantings, assumes emergents and shrubs on 1' spacing or 10 pieces per linear foot @ $2.00 each
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Bayview Road Fish Passage Blockage Removal

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	80	$7,200	Coordination with DPW
HPA and CAO permitting	hours	$90	60	$5,400	
Subtotal				$12,600	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	all within County road ROW
Transaction costs	lump sum	$6,000	0	$0	
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Replacement of existing culverts	lump sum	$160,000	1	$160,000	LBS estimate. See note
1998 costs updated to 2004				$191,056	assumes 3% annual inflation

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plantings	acres	$300	NA	10	see note
Effectiveness monitoring	lump sum	$300	NA	10	
Subtotal					

5. Summary

Total Present Worth Cost	$203,656
Add 15% contingency	$234,204

Notes

1. Lump sum cost estimate quoted from Leonard Budinot Skodje, Inc. report *Skagit County Culvert Evaluations - Fish Passage Improvements* (1998). (LBS's recommended alternative was to replace the Bay View Road culverts.)

2. Not enough detail is available about the LBS design to estimate required monitoring and maintenance costs.

No Name Watershed Project Cost Estimate Worksheet

Project Name: Egbers Floodplain Reconnection

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
HPA, Sec. 404 & CAO permitting	hours	$90	80	$7,200	
Subtotal				$12,600	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	Assumes no cons. easement needed
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Temporary site access	lump sum	$3,000	1	$3,000	temp. bridge across creek
Clearing for construction access	lump sum	$500	1	$500	see note
Creek bank regrading	CY	$15	300	$4,500	see note
LWD for grade control and habitat	each	$500	12	$6,000	provide and install
Seeding and mulching	acre	$500	0.2	$100	
Replanting banks and const.access	acre	$3,750	0.3	$1,125	
TESC / Stream protection BMPs	lump sum	$2,000	1.0	$2,000	
Subtotal				$17,225	
Tax				$1,361	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plantings	acres	$300	0.3	10	$695
Effectiveness monitoring	lump sum	$300	1	10	$2,317
Maintaining LWD	lump sum	$300	1	10	$2,317
Subtotal					$5,328

5. Summary

Total Present Worth Cost	$33,502
Add 15% contingency	$38,528

Notes

1. Unit cost of excavation assumed to be $15 due to difficult access conditions and need to remove soil from site.

2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each

3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Callahan Permanent Conservation Easement

1. Planning and Administration

Item	Units	Unit Cost	No.	Cost	Comment
Project management/admin	hours	$75	60	$4,500	
Subtotal				$4,500	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	71.3	$213,990	
Transaction costs	lump sum	$10,000	1	$10,000	
Subtotal				$223,990	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Site maintenance/stewardhip	acres	$150	71.3	10	$82,584
Subtotal					$82,584

5. Summary

Total Present Worth Cost	$311,074
Add 15% contingency	$357,735

Notes

1. Unit cost of excavation assumed to be $15 due to difficult access conditions, need to remove logging debris, and need to remove soil from site
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Modification of Paccar Detention Pond

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	80	$7,200	some hydraulic modeling needed
Permitting	hours	$90	0	$0	assumes no permits required
Subtotal				$7,200	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	no acquisition needed
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Build new flow control structure	each	$4,000	1	$4,000	See note
Remove old and install new struct.	lump sum	$5,000	1	$5,000	
TESC seeding and mulching	acre	$500	0.20	$100	
Subtotal				$9,100	
Tax				$719	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Effectiveness monitoring	l.s.	$500	1	3	$1,362
Subtotal					$1,362

5. Summary

Total Present Worth Cost	$18,381
Add 15% contingency	$21,138

Notes

1. Flow control structure to be a variable orifice outlet that lets high water from creek flow in and then meters out base flow water slowly.
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)

3. Uses a present worth discount factor for 3 years at 5% of 2.7232

No Name Watershed Project Cost Estimate Worksheet

Project Name: Farm to Market Road Bioswale No.2

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	50	$4,500	
County permitting	hours	$90	40	$3,600	Unclear what DPW will require
Subtotal				$8,100	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Modify existing road easement	lump sum	$5,000	1	$5,000	
Subtotal				$5,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - grading	CY	$15	370	$5,550	10' width, avg. depth = 1'
Rock grade controls / weirs	each	$500	10	$5,000	100' spacing
Imported gravel and compost	CY	$15	150	$2,250	3" to 6" depth; 15 cy per 100 LF
Traffic control during construction	days	$1,000	5	$5,000	
Plantings emergents and shrubs	LF	$20	1,000	$20,000	10 plants per LF
Subtotal				$37,800	
Tax				$2,986	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining plantings	acres	$600	0.23	10	$1,066	
Monitoring	l.s.	$800	1	10	$6,177	includes WQ mon.
Subtotal					$7,243	

5. Summary

Total Present Worth Cost	$61,129
Add 15% contingency	$70,299

Notes

1. For plantings, assumes emergents and shrubs on 1' spacing or 10 pieces per linear foot @ $2.00 each
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Egbers Wetland Enhancement

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
404 and CAO permitting	hours	$90	80	$7,200	Extensive permitting - already wetland
Subtotal				$12,600	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	2.0	$5,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$11,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Temporary site access	lump sum	$3,000	1	$3,000	temp. bridge across creek
Earthwork - excav. and berms	CY	$15	1600	$24,000	higher cost because near creek
Flow control weirs	each	$5,000	1	$5,000	
Plantings - buffer	acre	$3,750	0.72	$2,700	
Plantings - emergents	acre	$1,250	1.0	$1,250	
TESC seeding and mulching	acre	$500	0.6	$275	
Subtotal				$32,950	
Tax				$2,603	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.72	10	$2,780
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$6,641

5. Summary

Total Present Worth Cost	$65,794
Add 15% contingency	$75,663

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Bridgewater Estates Bioswales

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	50	$4,500	
County permitting	hours	$90	20	$1,800	Grading permit only
Subtotal				$6,300	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Modify drainage easements	lump sum	$3,000	1	$3,000	
Subtotal				$3,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - grading	CY	$15	280	$4,200	15' width, avg. depth = 1'
Rock grade controls / weirs	each	$500	5	$2,500	100' spacing
Imported gravel and compost	CY	$15	125	$1,875	3" to 6" depth; 25 cy per 100 LF
Traffic control during construction	days	$1,000	2	$2,000	
Plantings emergents and shrubs	LF	$30	500	$15,000	15 plants per LF
Subtotal				$25,575	
Tax				$2,020	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining plantings	acres	$600	0.17	10	$788	
Monitoring	l.s.	$800	1	10	$6,177	includes WQ mon.
Subtotal					$6,965	

5. Summary

Total Present Worth Cost	$43,860
Add 15% contingency	$50,439

Notes

1. For plantings, assumes emergents and shrubs on 1' spacing or 15 pieces per linear foot @ $2.00 each
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Lower Marihugh Road Bioswale

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	50	$4,500	
County permitting	hours	$90	40	$3,600	Unclear what DPW will require
Subtotal				$8,100	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Modify existing road easement	lump sum	$5,000	1	$5,000	
Subtotal				$5,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - grading	CY	$15	370	$5,550	10' width, avg. depth = 1'
Rock grade controls / weirs	each	$500	10	$5,000	100' spacing
Imported gravel and compost	CY	$15	150	$2,250	3" to 6" depth; 15 cy per 100 LF
Traffic control during construction	days	$1,000	5	$5,000	
Plantings emergents and shrubs	LF	$20	1,000	$20,000	10 plants per LF
Subtotal				$37,800	
Tax				$2,986	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining plantings	acres	$600	0.23	10	$1,066	
Monitoring	l.s.	$800	1	10	$6,177	includes WQ mon.
Subtotal					$7,243	

5. Summary

Total Present Worth Cost	$61,129
Add 15% contingency	$70,299

Notes

1. For plantings, assumes emergents and shrubs on 1' spacing or 10 pieces per linear foot @ $2.00 each
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

Part 2: Project Alternatives on the Flats

No Name Watershed Project Cost Estimate Worksheet

Project Name: McMoran Constructed Wetland

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
Permitting	hours	$90	30	$2,700	county grading permit only
Subtotal				$8,100	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	2.0	$6,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$12,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - excav. and berms	CY	$12	1600	$19,200	
Flow control weirs	each	$5,000	1	$5,000	
Plantings - buffer	acre	$3,750	0.83	$3,113	30' wide along berm
Plantings - emergents	acre	$1,250	1.0	$1,250	
TESC seeding and mulching	acre	$500	0.8	$415	
Subtotal				$28,978	
Tax				$2,289	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.83	10	$3,205
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$7,065

5. Summary

Total Present Worth Cost	$58,432
Add 15% contingency	$67,197

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Enlarge Remnant Estuary Channnel on the PDF

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	80	$7,200	
Permitting	hours	$90	80	$7,200	Extensive: HPA, 404, Shorelines
Subtotal				$14,400	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	Public land - assumes no acquisition
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Excavation / dredging	CY	$15	5600	$84,000	half dry excavation, half dredging
10' culvert at head	LF	$480	20	$9,600	placed under PDF access road
Repair PDF access road at culvert	lump sum	$1,000	1	$1,000	
TESC and stream protection	lump sum	$2,000	1	$2,000	
Plantings - buffer	acre	$3,750	1.38	$5,175	30' wide along dredge spoil berm
Plantings - emergents	acre	$1,250	1.4	$1,725	
TESC seeding and mulching	acre	$500	1.4	$690	
Subtotal				$104,190	
Tax				$8,231	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	1.38	10	$5,328
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$9,189

5. Summary

Total Present Worth Cost	$136,010
Add 15% contingency	$156,411

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Pump House Reservoir Riparian Buffer

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$50	40	$2,000	
Permitting	hours	$90	0	$0	Assumes done as part of No. 3B
Subtotal				$2,000	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	0.0	$0	
Transaction costs	lump sum	$6,000	0	$0	Public land - assumes no acquisition
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Earthwork - dredge spoil berms	CY	$6	5600	$33,600	see note
TESC and stream protection	lump sum	$2,000	1	$2,000	
Plantings - buffer	acre	$3,750	1.10	$4,125	30' wide along berm
TESC seeding and mulching	acre	$500	1.1	$550	
Subtotal				$40,275	
Tax				$3,182	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	1.1	10	$4,247
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$8,108

5. Summary

Total Present Worth Cost	$53,565
Add 15% contingency	$61,599

Notes

1. Cost for berms is cost to transport spoils from project 3B site and shape into berms
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers

3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Maintain and Enhance Existing Riparian Buffer along Slough

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$50	80	$4,000	
Subtotal				$4,000	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	2.6	$7,800	40' wide easemnt on about 2800 LF
Transaction costs	lump sum	$6,000	1	$6,000	of south bank of slough
Subtotal				$13,800	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Site preparation	acre	$1,000	1.9	$1,900	Mechanical clearing of blackberry, etc.
Plantings - buffer	acre	$1,250	1.9	$2,375	see note
Subtotal				$4,275	
Tax				$338	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$300	1.9	10	$4,401
Buffer monitoring	l.s.	$300	1	10	$2,317
Subtotal					$6,718

5. Summary

Total Present Worth Cost	$29,131
Add 15% contingency	$33,500

Notes

1. For plantings, assume 250new trees per acre @ $5.00 interspersed with existing shrubs and trees

2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Egbers Constructed Wetland and Culvert Replacement

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	80	$7,200	
Permitting	hours	$90	80	$7,200	HPA and CAO review
Subtotal				$14,400	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	1.0	$3,000	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$9,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Excavation / dredging	CY	$12	1600	$19,200	mostly dry land
Flow control weirs	each	$5,000	1	$5,000	
10' culvert at head	LF	$480	20	$9,600	replace existing 4' culvert at farm road
TESC and stream protection	lump sum	$2,000	1	$2,000	
Plantings - buffer	acre	$3,750	0.55	$2,063	30' wide along berm
Plantings - emergents	acre	$1,250	0.5	$625	
TESC seeding and mulching	acre	$500	0.6	$300	
Subtotal				$38,788	
Tax				$3,064	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.55	10	$2,123
Wetland and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$5,984

5. Summary

Total Present Worth Cost	$71,236
Add 15% contingency	$81,921

Notes

1. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffers and 500 aquatic emergents per acre @ $2.50 each for wetlands (i.e. only around the shoreline)
2. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Widening and Dredging the Upper Slough

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	100	$9,000	
Permitting	hours	$90	80	$7,200	HPA and CAO review
Subtotal				$16,200	

2. Property Interest Acquistion

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$3,000	2.5	$7,500	
Transaction costs	lump sum	$6,000	1	$6,000	
Subtotal				$13,500	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Dredging existing slough	CY	$12	450	$5,400	
Excavate floodplain & construct berm	CY	$20	2300	$46,000	see note
LWD revetment / habitat cover	each	$500	8	$4,000	At confluence - bank armor and habitat
Flapgate culverts through berm	each	$1,000	3	$3,000	Plumb existing ditches through the berm
TESC and stream protection	lump sum	$2,000	1	$2,000	
Plantings - buffer on new berm	acre	$3,750	0.8	$2,813	15' wide along berm
TESC seeding and mulching	acre	$500	2.2	$1,100	
Subtotal				$64,313	
Tax				$5,081	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	0.8	10	$2,896
Erosion and buffer monitoring	l.s.	$500	1	10	$3,861
Subtotal					$6,756

5. Summary

Total Present Worth Cost	$105,850
Add 15% contingency	$121,727

Notes

1. Assumes 2' high berm with x/s areaof 25 sf x 2400 LF totalling about 2300 cy, which is the same volume excavated from the new floodplain.
2. For plantings, assume 750 trees/shrubs per acre @ $5.00 each for buffer along the berm.
3. Uses a present worth discount factor for 10 years at 5% of 7.7217

No Name Watershed Project Cost Estimate Worksheet

Project Name: Filter Strips and Field Ditch BMPs

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$50	50	$2,500	
Permitting	hours	$75	0	$0	no permits needed
Subtotal				$2,500	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	assume no land acquisition (see note)
Transaction costs	lump sum	$6,000	0	$0	
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Filterstrip planting	acre	$1,000	0.4	$400	high unit cost because of long length
Sediment control weirs	each	$750	6	$4,500	at ditch outlets - see note 2.
Subtotal				$4,900	
Tax				$387	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth	
Maintaining filter strips	acres	$500	0.4	10	$1,544	
maintaining weirs	each	$150	6	10	$6,950	see note 3
Subtotal					$8,494	

5. Summary

Total Present Worth Cost	$16,281
Add 15% contingency	$18,723

Notes

1. A 3-foot wide filterstrip along the entire length of the slough from the Egbers/Wallace field ditch to the Dahlstead box culvert (about 5780 LF) would take up about 0.40 acres of land. Given this small area next to the slough, it is assumed that no property acquistion or easement would be practicable.
2. Assumes permanent V- notch weirs placed at field ditch and V- ditch outlets
3. Inlcudes mowing filter strips, dredging sediment from behind weirs, and maintenance of the weirs

No Name Watershed Project Cost Estimate Worksheet

Project Name: Upgrade Tidegate Flap Gates

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	60	$5,400	
Permitting	hours	$90	20	$1,800	HPA needed?
Subtotal				$5,400	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy conservation easement	acre	$2,500	0.0	$0	no land acquisition needed
Transaction costs	lump sum	$6,000	0	$0	
Subtotal				$0	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Fabricate new flap gates	each	$1,000	4	$4,000	see note
Install new flapgates	each	$1,000	4	$4,000	
Subtotal				$8,000	
Tax				$632	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Tide gate maintenance	each	$200	4	10	$6,177
Subtotal					$6,177

5. Summary

Total Present Worth Cost	$20,209
Add 15% contingency	$23,241

Notes

1. Assumes existing culverts retrofitted with a light-weight plastic/overhanging pivoting hinge design such as the one developed by the Stillaguamish Flood Control District

No Name Watershed Project Cost Estimate Worksheet

Project Name: Dikes from mouth of slough to Farm to Market Road

1. Design and Permitting

Item	Units	Unit Cost	No.	Cost	Comment
Design and management	hours	$90	200	$18,000	
Permitting	hours	$90	160	$14,400	Extensive: HPA, 404, Shorelines
Subtotal				$32,400	

2. Property Interest Acquisition

Item	Units	Unit Cost	No.	Cost	Comment
Buy dike easement	acre	$3,000	30.0	$90,000	For private land, not including PDF
Transaction costs	lump sum	$20,000	1	$20,000	
Subtotal				$110,000	

3. Construction and Implementation

Item	Units	Unit Cost	No.	Cost	Comment
Site prep. (clearing)	acre	$1,000	2	$2,000	
Earthwork - dredge and build dike	CY	$20	101,335	$2,026,700	see quantity estimate worksheet
Armor mouth of dikes with rock	CY	$10	450	$4,500	assumes salvage of existing rip rap
Install new bridge at BV-E Rd	lump sum	$500,000	1	$500,000	see note
Tidegates at ditches through dikes	each	$20,000	6	$120,000	
Remove old dike at slough mouth	CY	$15	4,800	$72,000	Assumes 300 LF length
Remove old tidegates and pumps	lump sum	$5,000	1	$5,000	
Hydroseeding dikes	sf	$0.15	652,400	$97,860	
TESC and stream protection	lump sum	$50,000	1	$50,000	
Plantings inside dike-trees	acre	$3,750	5.8	$21,750	see note
Plantings - high marsh	acre	$2,250	5.8	$13,050	see note
Subtotal				$2,912,860	
Tax				$230,116	

4. Maintenance and Monitoring

Item	Units	Unit Cost	No.	Years	Present Worth
Maintaining plant buffers	acres	$500	5.8	10	$22,393
Monitoring	l.s.	$5,000	1	10	$38,609
Subtotal					$61,001

5. Summary

Total Present Worth Cost	$3,346,377
Add 20% contingency	$4,015,653

Notes

1. Assumes a 90' x 28' concrete single span bridge, including removal of the existing culvert and repaving road
2. For plantings, assume the area between the dikes will be planted to transition from tree/shrub to high marsh to low marsh. 15' wide strip of tree/shrub at 750 stems/acre @ $5 ea; 20' wide strip of low marsh at 750 stems/acre at

$3.00 ea., then assume no planting on low marsh and mudflat (same both sides of the channel).
3. Uses a present worth discount factor for 10 years at 5% of 7.7217

Table 6-2. Summary of Project Cost Estimates

Project Type or Name	No.of Projects	Project Design & Management	Property Acquisition	Construction & Implementation	10-year Maintenance & Monitoring	Total Present Worth	Add 15% Contin-gency*
UPLAND PROJECTS							
Upland Wetland Enhancement	5	$53,400	$51,500	$142,577	$27,257	$274,734	$315,944
Roadside Bioswales	5	$38,700	$23,000	$153,337	$34,964	$250,001	$287,501
Creek Floodplain Reconnection	3	$34,200	$8,500	$66,332	$15,057	$124,089	$142,702
Upland Riparian Buffers	4	$4,500	$24,500	$37,348	$21,119	$87,467	$100,587
Bay View Rd Fish Blockage Removal	1	$12,600	$0	$191,056		$203,656	$234,204
Marihugh Rd. Septic Tank Replacement	1	$3,000	$0	$11,869	$600	$15,469	$17,789
Callaghan Perm. Conserv. Easement	1	$4,500	$223,990	$0	$82,584	$311,074	$357,735
Modify Paccar Detention Pond	1	$7,200	$0	$9,819	$1,362	$18,381	$21,138
PROJECTS ON FLATS							
Constructed Wetlands	3	$35,100	$32,000	$108,672	$19,690	$195,462	$224,781
Filter Strips and Field Ditch BMPs	1	$2,500	$0	$5,287	$8,494	$16,281	$18,723
Widen Upper Slough	1	$16,200	$13,500	$69,394	$6,756	$105,850	$121,728
Enhance Existing Buffer along Slough	1	$4,000	$13,800	$4,613	$6,718	$29,131	$33,501
Widen & Enhance PDF Slough Channels	2	$16,400	$0	$155,878	$17,297	$189,575	$218,011
Upgrade Tidegate Flap Gates	1	$5,400	$0	$8,632	$6,177	$20,209	$23,240
Construct New Dike to F to M Rd.*	1	$32,400	$110,000	$3,142,976	$61,001	$3,346,377	$4,015,652
* uses a 20% contingency							
Totals	**31**						**$6,133,238**

"Big Dike" Construction Quantity Estimate

1. Dikes

Reach	south dike length (ft)	north dike length (ft.)	Avg. gse (ft MLLW)	Design h (ft)	Top width (ft)	Base width (ft)	x/s area (sf)	volume (cy)	Dike SA (sf)	Site width (ft)*	site area (ac)
0+00 to 10+70 (mouth to BV-E Road)	1070	620	3.8	9	12	57	311	19,435	102,414	334	6.5
10+90 to 18+00 (Rd. to end of low area)	920	760	3.0	10	12	62	370	23,022	110,880	264	5.1
18+00 to 56+50 (to Egbers culvert)	3050	2440	6.7	6	12	42	162	32,940	260,226	224	14.1
56+50 to 70+00 (culvert to edge of low pt.)	1200	0	6.7	6	12	42	162	7,200	56,880	152	4.2
70+00 to 96+20 (to Dahlstedt box culvert)	2450	0	6.0	7	12	47	207	18,738	122,010	157	4.4
Total	8690	3820						101,335	652,410		34.3

* = Assumes 200' width between dikes from mouth to BV-E Road, then 120' foot width between dikes from BV-E Road to ridge, plus width of dike footprint, plus 10' setback (each side). From base of ridge upstream to Farm to Market Road, the site width is assumed to be 100 feet, plus the dike footprint, plus a 10 foot set-back.

2. Reservoir

Reach	Reservoir depth (ft)*	Reservoir width (ft)	x/s area (sf)	Volume (cy)	x/s exist. slough (sf)	vol. exist. slough (cy)	volume to dredge (cy)	fill less cut (cy)	
0+00 to 10+70	3.8	200	380	11,893	120	4,756	7,137	12,298	
10+90 to 18+00	3.0	120	180	5,600	100	2,630	2,970	20,052	
18+00 to 56+50	5.7	120	342	34,770	75	10,694	24,076	8,864	
56+50 to 70+00	4.7	100	235	10,444	60	3,000	7,444	-244	
70+00 to 96+20	4.0	100	200	18,148	50	4,852	13,296	5,442	
Total				80,855		25,931	54,924	**46,411**	(amount brought to site)

*Assumes target elevation of thalweg at pump house pond is 0.0' MLLW, rising to 2.0' MLLW at upstream end of slough